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Streptomycin Treatment in Pulmonary Tuberculosis

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Public Health Reports

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— Editorial —

Evaluation of Therapy

Throughout the history of medicine there have been many episodes in which enthusiasm over untested drugs or therapeutic procedures has led to a premature and uncritical acceptance of such measures as "cures" or "remedies." The bitter disillusionment and disappointment which followed was a serious blow not only to the patients involved, but to medicine itself.

The fight against tuberculosis has had its full measure of these episodes. We can recall, for example, the widespread heralding of tuberculin and gold in the treatment of the disease, and their subsequent discreditation. Because of the very nature of tuberculosis—its chronicity, its remissions and exacerbations, and its protracted onset and course, to say nothing of its overwhelming toll of human suffering and death—it is, of course, most difficult to maintain an objective and critical attitude toward therapeutic measures which show any likelihood of promise.

Moreover, the proper evaluation of any kind of tuberculosis therapy is fraught with the most serious difficulties. Walker and Barnwell [1] have aptly summarized these difficulties as follows: "It would be useful to recall the factors which make clinical tuberculosis unusual—(a) the many anatomical subdivisions into which it must be divided, subdivisions which are connected only by a common etiology and pathology and are so disparate from each other that one is faced, really, with a whole dictionary of diseases rather than with a single entity; (b) the extraordinary chronicity, which makes necessary a long continued period of observation; (c) the difficulty, the impossibility in any single instance except those of miliary and meningeal tuberculosis, of prophesying recovery or death, which makes necessary the observation of many cases, and (d) the peculiarities of the bacillus

[1] Walker, A. M. and Barnwell, J. C.: Clinical evaluation of chemotherapeutic drugs in tuberculosis. Annals of New York Academy of Sciences. **52**: 742 (1949).

This is the fifty-seventh of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

which make it difficult for culture and different in its virulence against various racial and familial groups."

The discovery of streptomycin a few years ago brought with it a new hope for the effective treatment and ultimate conquest of tuberculosis. Early tests indicated that the new antibiotic was not uncontrollably toxic and that it was bacteriostatic *in vivo*. However, with the promise of this new drug came also the responsibility for determining its precise place in the treatment of the disease.

The accompanying article, "A Controlled Investigation of Streptomycin Treatment in Pulmonary Tuberculosis" reports a study of streptomycin which has been conducted as a cooperative venture. Acknowledging the complexity of the disease and the fact that no single institution can furnish enough cases for a definitive answer, a group of tuberculosis clinicians in hospitals and sanatoria in widespread points of the United States joined in this cooperative study, each adhering steadfastly to a carefully designed protocol. The manner in which this evaluation study was undertaken cannot but be considered a tribute to the courage and scientific acumen of those who participated in the program.

There is no doubt that further work in this area will produce refinements of technique and improvements of methods, for there is much yet to be learned about the most effective way in which such studies should be carried out. However, the streptomycin study reported in this issue illustrates that in the evaluation of specific tuberculosis therapy, the scientific approach and the careful use of controls are essential.

ROBT J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

A Controlled Investigation of Streptomycin Treatment in Pulmonary Tuberculosis

By Esmond R. Long, M. D., and Shirley H. Ferebee, B. A.*

In March 1950, 12-month observations were completed on the last of a series of 541 tuberculous patients studied to determine the effect of adding streptomycin to other therapeutic measures in the treatment of tuberculosis. Preliminary analyses of the results are presented at this time.

In July 1947, the Tuberculosis Study Section of the Division of Research Grants and Fellowships of the National Institutes of Health was asked to plan and direct clinical trials on streptomycin therapy in the treatment of tuberculosis. Previous investigations had indicated a distinct and often dramatic improvement in many cases treated with streptomycin. However, further evidence was essential to distinguish the effect of the drug from the vagaries of the disease and the effect of other treatment. The Study Section agreed that the major portion of the funds specifically appropriated by the Congress for streptomycin research could best be employed in a rigorously planned investigation designed to determine, through the use of concurrent controls, the effect of adding streptomycin to other therapeutic measures.

Investigators in different parts of the country, with grants from the Division of Research Grants and Fellowships, participated in the study, managed their cases under a common protocol, and made uniform observations at uniform time periods.

The inquiry included the broad range of pulmonary tuberculosis, excluding only minimal disease at one extreme and terminal disease at the other. The criteria for the selection of cases were: pulmonary disease, bacteriologically proved, and judged capable of significant objective improvement without streptomycin.

Admission of Cases

The cooperating clinical investigators submitted X-ray films and laboratory and clinical data on patients under care in their institutions whom they considered suitable candidates for the study. This material was received in a central office, where the Study Section's Selection Panels met at 3-week intervals from November 1947 through

*Chairman, Steering Committee, Tuberculosis Study Section, National Institutes of Health, and Chief, Therapy Evaluation Section, Field Studies Branch, Division of Tuberculosis, Public Health Service, respectively. Presented at the 46th Annual Meeting of the National Tuberculosis Association, Washington, D. C., April 25, 1950.

February 1949 to consider cases submitted by the investigators. Each panel was composed of three clinical experts in tuberculosis who determined independently, without knowing the name of the patient or the institution, whether each case satisfied the criteria for admission to the study.

At the time of selection, every "admitted" case was classified by each member of the selection panel in the scale between "arrested" and "dead" according to the prognosis for 1 year without streptomycin. This prognostic rating was used to array separately for each hospital the cases in an order ranging from the most to the least favorable prognosis. It was determined by chance for each hospital whether the odd- or even-numbered cases should be allocated to the streptomycin group. Thus, in each hospital, the patients in the groups receiving and not receiving streptomycin were approximately equal in number and severity of disease. In this way, any conditions within a hospital which might influence response to therapy would presumably bear equally on both the streptomycin and control groups.

Of the 629 candidates proposed by the clinical investigators, 541 were approved by selection panels for study. No new cases were accepted for study after February 1949.

Observation and Treatment Period

All patients in both groups received any form of therapy, including collapse or surgical procedures, which the individual clinical investigator thought was indicated. It should be stressed that the participating clinical investigators had complete freedom of judgment in the management of the cases in the study except with respect to the variable under investigation, streptomycin therapy. In two initially comparable groups, other forms of therapy not dependent upon streptomycin should be indicated equally for cases in the two groups. In this way, it was expected that patients receiving streptomycin would be managed in essentially the same way as the controls, but with the addition of 20 mg. of streptomycin per kilogram of body weight for 91 days.

Additional treatment with streptomycin was permissible under the protocol. It was recognized that there was available no definitive knowledge as to the optimum length of streptomycin therapy. The study was designed to determine the effect of adding streptomycin to accepted therapeutic procedures. The optimum length of streptomycin therapy beyond the 91-day course was decided for each patient in the streptomycin group by the hospital in which he was under treatment. Actually, only 27 cases received a second course of the drug. Thus, the question might be phrased, "What can streptomycin at its indicated optimum add to all other treatment?"

According to the protocol, each patient was to remain under observation for 1 year from the time of selection for the study. At the end of each 3-month period, as well as at the time of selection, clinical and bacteriological records and X-rays were sent to the central office for coordinated evaluation and study.

Initial Characteristics of Population

If the usefulness of adding streptomycin to classical therapeutic measures is to be judged by comparing the degree of progression and retrogression in two groups of patients, these two groups must be comparable at the beginning of the observation period and thus possess equal potentialities for change. It is pertinent then to examine the two groups at selection with respect to as many variables as possible. Table 1 gives information on the characteristics of cases in the two groups at the time of selection for study. It is obvious from inspection that the streptomycin and control groups are similar with respect to all the variables considered. Therefore, examination of the composition of the two groups may be simplified by a discussion of the characteristics of the total group under observation.

About six-tenths of the cases were white, and there were slightly more males than females. Approximately half of the patients were between 25 and 44 years of age, with fewer "over 45" than "under 25".

An indication of the recency of the disease is afforded by information on the length of the present hospitalization. At the time of selection for study, about six-tenths of the cases had been in the sanatorium for less than 3 months. No account has been taken of whether the present hospitalization was the first or one in a series of hospital stays for tuberculosis.

That only two-tenths of the cases were markedly febrile at the time of selection for study may appear surprising for a group of tuberculous patients until one considers that these were patients already under care in the cooperating institutions and were not necessarily selected for study at the time of their hospital admission.

Approximately three-tenths of the group under study were not producing sputum at the time of selection, another six-tenths, only a slight or moderate amount, and less than one-tenth, copious sputum.

The fact that less than 5 percent of the patients had received any previous treatment with streptomycin therapy at the time of selection for study reflects a situation which probably could not again be duplicated in these or similar sanatoria. It would not now be possible to accumulate in these hospitals a series of over 500 patients who had not already been treated with streptomycin. Thus, this study was, on the very practical point of available case material alone, carried out

Table 1. *Characteristics of 270 streptomycin and 271 control cases at time of selection for study*

Characteristics and treatment		Percent of group	
		Streptomycin	*Control*
Race	White	59.6	62.0
	Nonwhite	40.4	38.0
Sex	Male	53.0	53.1
	Female	47.0	46.9
Age	Under 25	27.0	28.4
	25–44	54.8	51.3
	45 and over	18.2	20.3
Length of present hospitalization	Less than 3 months	63.6	55.0
	3 to 5 months	12.6	16.2
	6 to 11 months	15.6	16.6
	1 year or more	8.2	12.2
Temperature	Markedly febrile	18.5	19.2
	Slightly febrile	50.0	43.9
	Afebrile	31.5	36.9
Body weight	Normal or overweight	24.4	24.6
	Underweight	75.6	75.4
Amount of sputum	None	28.8	27.2
	Slight	27.4	30.6
	Moderate	34.8	34.7
	Copious	9.0	7.5
Previous streptomycin therapy	Streptomycin	4.4	3.3
	No streptomycin	95.6	96.7
Surgery or collapse procedures in effect.[1]	None	79.2	73.0
	Pneumothorax	8.0	8.6
	Pneumoperitoneum	9.1	10.1
	Thoracoplasty	2.2	6.1
	Phrenic nerve operation	1.5	2.2
Stage of disease	Moderately advanced	34.3	34.7
	Far advanced	65.7	65.3
Predominant morphology	Exudative	38.7	41.2
	Caseous	48.6	44.7
	Fibrotic	12.7	14.1
Dynamics	Acute	36.5	35.8
	Subacute	41.4	42.3
	Chronic	22.1	21.9
Course	Progressive	68.8	63.5
	Stationary	25.4	28.1
	Retrogressive	5.8	8.4
Cavitation	Definitely present	83.5	84.8
	Not present	16.5	15.2

[1] Cases receiving more than one form of surgery or collapse procedure are duplicated.

at the latest date on which a control study on streptomycin could have been made.

Surgical or collapse procedures were in effect in only about one-fourth of the cases in each group at the time of selection for study. The two groups were very similar except that there were slightly more patients among the controls who had had thoracoplasty prior to the study. By the National Tuberculosis Association quantitative classification of X-ray findings, about two-thirds of both groups had far advanced and one-third, moderately advanced disease.

The type of disease which extended over the largest area within the diseased portion of the lungs determined the qualitative or morpholog-

ical classification which was based on consideration of prestudy and selection films and clinical data. Nearly half of both groups were judged to have predominantly caseous disease, most of the others had predominantly exudative disease, and only a small remainder, fibrotic. Note should be taken of the use of the qualifying term "predominant," since it is recognized that the tuberculous process is a continuum usually containing more than one morphological element and that such judgments based on film interpretation are at best crude estimates.

The tuberculous disease was classified as subacute for more than two-fifths of the total, acute for about two-fifths, and chronic for only about one-fifth. The disease was judged to be progressive in nearly two-thirds of the group, stationary in one-fourth, and in only a small remainder, retrogressive or improving at the time the cases were selected for study. Four-fifths of the total cases under observation showed definite cavities on X-ray.

Losses

In this study, as in most similar ones, certain "losses" in the groups under observation occurred. Both the nature and the extent of such losses must be examined to determine the effect upon the remaining observations. If losses from two initially comparable groups are unrelated to the variable under investigation, in this instance, receipt of streptomycin, the comparability of those remaining in the two groups is not disturbed. But, on the other hand, if a particular kind of case is lost from one group in greater numbers than from the other, the remainders plainly are no longer comparable.

Table 2 shows the losses occurring in the streptomycin and control groups by time of occurrence. By the end of 12 months, 44 streptomycin cases and 77 control cases were considered lost.

Discharges from the hospital with medical consent were approximately equal in the two groups, 15 streptomycin and 17 control cases. However, more control cases left the hospital against medical advice, 35 compared with 22 in the streptomycin group. The lower unadvised departure rate among those receiving drug therapy may have been due to psychological factors. The tabulation indicates that in the streptomycin group there were only 4 such losses during the first 6 months, that is, during and immediately after the 91-day course of streptomycin, as compared to 18 during the second 6 months. There were, of course, other cases discharged but only those with no further observations after discharge were considered losses.

Two cases of tuberculous meningitis occurred in the control group, and were treated immediately with streptomycin, while none was reported in the streptomycin group. They have been included in the

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Table 2. *"Losses" occurring in the streptomycin and control groups by reason and by report period*

	Total	3 months	6 months	9 months	12 months
Streptomycin group					
Total	44	8	5	13	18
Left hospital:					
With permission	15		2	3	10
Against advice	22	1	3	10	8
Refused streptomycin	2	2			
Incomplete course of streptomycin	5	5			
Control group					
Total	77	15	18	20	24
Left hospital:					
With permission	17	1	1	2	13
Against advice	35	4	10	13	8
Meningitis	2	1	1		
Treated with streptomycin:					
Appeals approved	12	1	5	4	1
Without clearance	11	8	1	1	2

analysis as control deaths since, before the availability of streptomycin, such cases are all believed to have died very soon. A small, relatively unimportant, group of 7 streptomycin cases had to be considered "not available" because they either refused the drug or did not complete the 91-day course.

In order to protect the study from great losses due to treatment of the controls with streptomycin, an appeals board was created. This board reviewed the clinical and X-ray data on control cases in which a critical, potentially life-threatening tuberculous episode had occurred and for which streptomycin might be considered the only possible effective therapy. Of the 22 cases considered by the board, deviation from the protocol was authorized for 12 controls. In addition, 11 other controls received streptomycin without clearance, contrary to the protocol.

In the analysis, observations have been included on lost cases up to the period when the loss occurred. For example, if a patient left the hospital after 8 months' observation, data on such a patient collected at the 3- and 6-month report periods have been included in the comparisons of the two groups at those points in time. For report periods occurring after the date of loss, observations on lost cases have been considered "not available." The most troubling losses from the standpoint of analysis are the controls treated with streptomycin. Several alternative methods of handling the "streptomycin treated controls" were considered but none appeared entirely satisfactory. The decision was finally reached to include them among the "not available" group recognizing that this method created a bias favoring the controls. In the discussion of the results further mention will be made of the effect of this bias.

An indication of the effect of losses on the comparability of the remaining cases in each group may be obtained by a consideration of

what the composition of groups under study would have been if the lost cases had never been admitted to the study. In appendix table 1, the characteristics *at selection* of the total groups with which the study was begun are compared with the characteristics for the groups which completed 3, 6, 9, and 12 months. The remaining groups under observation decrease at each further point in time and this table is designed to indicate whether the character of the groups changed and, if so, whether that change was different in the streptomycin and the control groups. It is apparent that there were shifts in the composition of the groups under study as losses occurred. However, the two groups still retain their basic similarity; although both differ from their original composition, they are still like each other.

Results

Mortality

Deaths during the 12-month observation period occurred unequally in the two groups, 21 in the streptomycin group and 40 in the controls. As shown in the text table below, the greater number of deaths in the control group is produced almost entirely by a higher rate among the controls during the first 6 months of observation, when 26 controls and only 8 streptomycin cases died. During the second 6-month period, there were 13 deaths in the streptomycin group and 14 in the control group. If the decreasing difference in rates should represent a "death delaying" rather than a "life saving" phenomenon, then it would be expected that with continued observation the mortality rate would be higher at some later period for the streptomycin than for the control group. As data on this point become available, the results of further observation will be reported.

Deaths in the streptomycin and control groups by time of occurrence

Group	Total	3 Months	6 Months	9 Months	12 Months
Streptomycin	21	4	4	6	7
Control	40	11	15	9	5

Table 3 shows by age, race, and sex, the distribution of the deaths in the streptomycin and control groups occurring during the 12 months of observation, as well as the rates per 100 persons in each subgroup. In both groups, the mortality rate is higher for males than for females and higher among nonwhites than among whites.

Deaths among nonwhite males in the controls were high in every age group, ranging between 26.3 and 31.6 per 100 persons. Although nonwhite males 25 years of age or older receiving streptomycin had similar rates, those under 25 years of age receiving streptomycin showed no deaths. The nonwhite females showed a different pattern:

Table 3. *Deaths by age, race, and sex in streptomycin and control groups during 12 months of observation*

Race and sex	All ages		Under 25 years		25–44 years		45 and over	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
	Number of deaths							
All races	21	40	3	12	13	22	5	6
Male	15	21	-	5	11	10	4	6
Female	6	19	3	7	2	12	1	-
White	5	14	-	2	2	9	3	3
Male	4	7	-	-	2	4	2	3
Female	1	7	-	2	-	5	1	-
Nonwhite	16	26	3	10	11	13	2	3
Male	11	14	-	5	9	6	2	3
Female	5	12	3	5	2	7	-	-
	Number of persons							
All races	270	271	73	77	148	139	49	55
Male	142	144	30	32	75	68	38	44
Female	127	127	43	45	73	71	11	11
White	161	168	42	41	83	87	36	40
Male	83	96	13	13	41	49	29	34
Female	78	72	29	28	42	38	7	6
Nonwhite	109	103	31	36	65	52	13	15
Male	60	48	17	19	34	19	9	10
Female	49	55	14	17	31	33	4	5
	Deaths per 100 persons							
All races	7.8	14.8	4.1	15.6	8.8	15.8	10.2	10.9
Male	10.5	14.6	-	15.6	14.7	14.7	10.5	13.6
Female	4.7	15.0	7.0	15.6	2.7	16.9	9.1	-
White	3.1	8.3	-	4.9	2.4	10.3	8.3	7.5
Male	4.8	7.3	-	-	4.9	8.2	6.9	8.8
Female	1.3	9.7	-	7.1	-	13.2	14.3	-
Nonwhite	14.7	25.2	9.7	27.8	16.9	25.0	15.4	20.0
Male	18.3	29.2	-	26.3	26.5	31.6	22.2	30.0
Female	10.2	21.8	21.4	29.4	6.5	21.2	-	-

among the controls, the rates were high for those under 45 years of age, with no deaths among those over 45; those receiving streptomycin showed a high rate among those under 25, a low rate for those between 25 and 44, and no deaths among those over 45.

Deaths among white males were greater among the controls in the 25- to 44-year-age group, and among the streptomycin cases in the 45- to 65-age group. White females showed the highest rate for the controls in the 25- to 44-year range, while there was only one death among white females receiving streptomycin.

As judged by the deaths per 100 persons, it appears that streptomycin was most effective in reducing mortality among nonwhite males under 25 years of age, nonwhite females between the ages of 25 and 44, white males from 25 to 44 years, and white females under 45 years. However, since the detailed comparisons are based on very small numbers, the findings must be taken as indicative rather than conclusive.

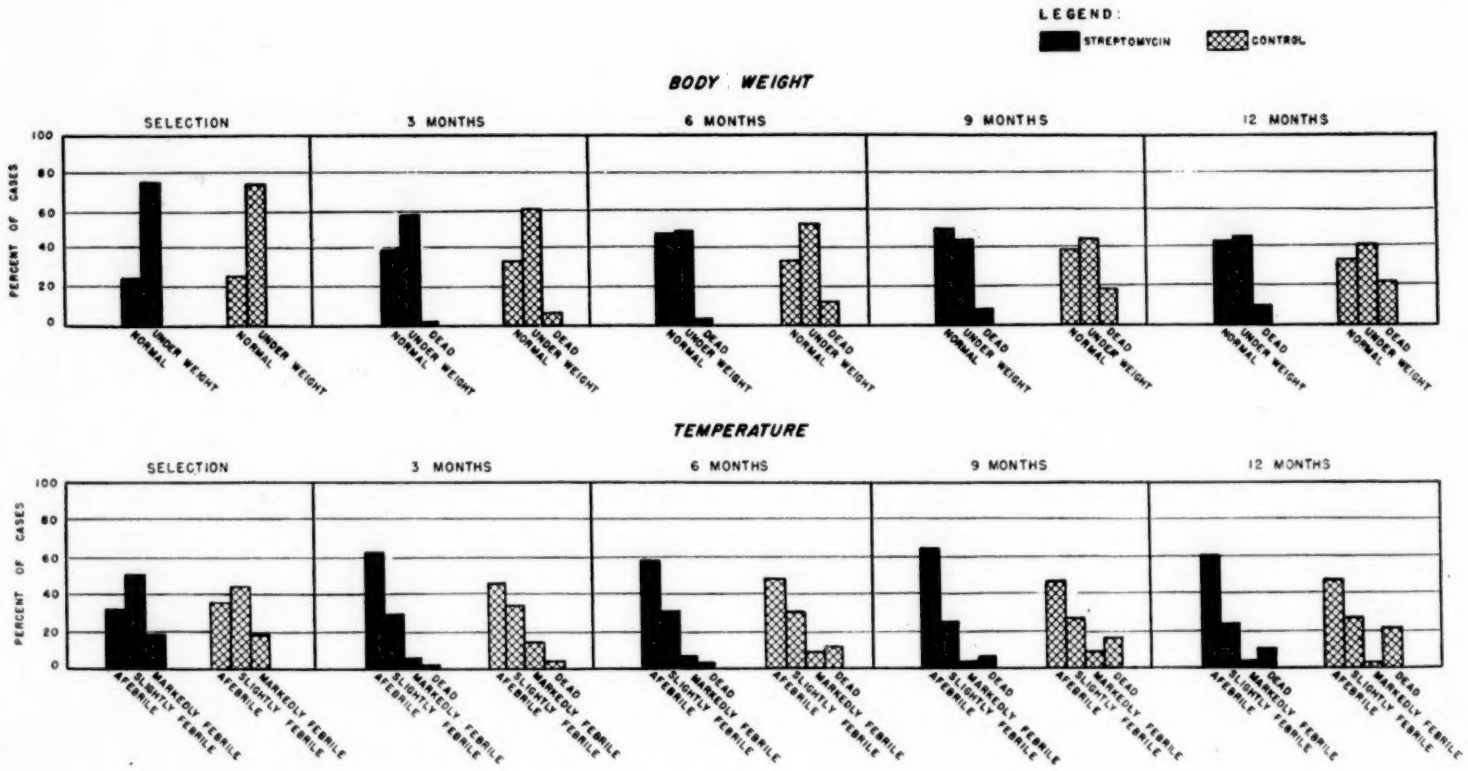
Clinica Change

Every 3 months during the year of observation, the results of detailed uniform examination of all patients under study were reported to the central office. Observations are available on such a wide variety of items as urinalysis, blood-urea-nitrogen, complete blood counts, cough, activity, appetite, and toxic manifestations. However, for this preliminary analysis, the streptomycin and control groups have been compared only with respect to those items generally regarded as the most critical measures of change in tuberculosis. Data are presented in this section on temperature, body weight, and amount and bacillary content of sputum. In the body of the paper, the percentage distributions of the two groups at each report period are presented in tabular and graphic form, based on the total observations available, while the appendix contains corresponding tables of the actual frequencies, including the number of observations "not available." Since the material on which the findings are based is not very large for many of the subdivisions, the random error must be very great, and results based on the smaller groupings must be viewed as suggestive only, subject to confirmation or disproof. For each of the examinations, the patients under study have been subdivided according to an appropriate scale ranging from the optimum to the least favorable condition.

Body Weight

Changes in body weight are significant only when viewed against some sort of measure of the desirability of such change. Circumstances such as general body build, normal weight, and previous weight changes obviously vary greatly among a large group of patients and are not easily classified objectively. Therefore, a simple scheme which takes some account of these factors has been used in this analysis. On the basis of weight, age, and height, each patient in the study has been classified as overweight, normal weight, or underweight. Deviation of 10 pounds from the norm as given in a standard chart has been used for classification as over or under weight. In table 4 and the first section of figure 1, normal and overweight have been grouped together, as representing a desired or favorable end of the scale of weight change.

Examination of the "underweight" category shows a great similarity between the streptomycin and control groups; about 75 percent of each were underweight at time of selection and more than 40 percent of each were still underweight at the end of a year. However, of the patients whose underweight status changed, those receiving streptomycin tended to improve and move into the "normal or overweight" category, while among those not receiving streptomycin about twice as many died as improved with respect to weight gain.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STREPTOMYCIN
CONTROL
BODY WEIGHT
SELECTION
3 MONTHS
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9 MONTHS
12 MONTHS
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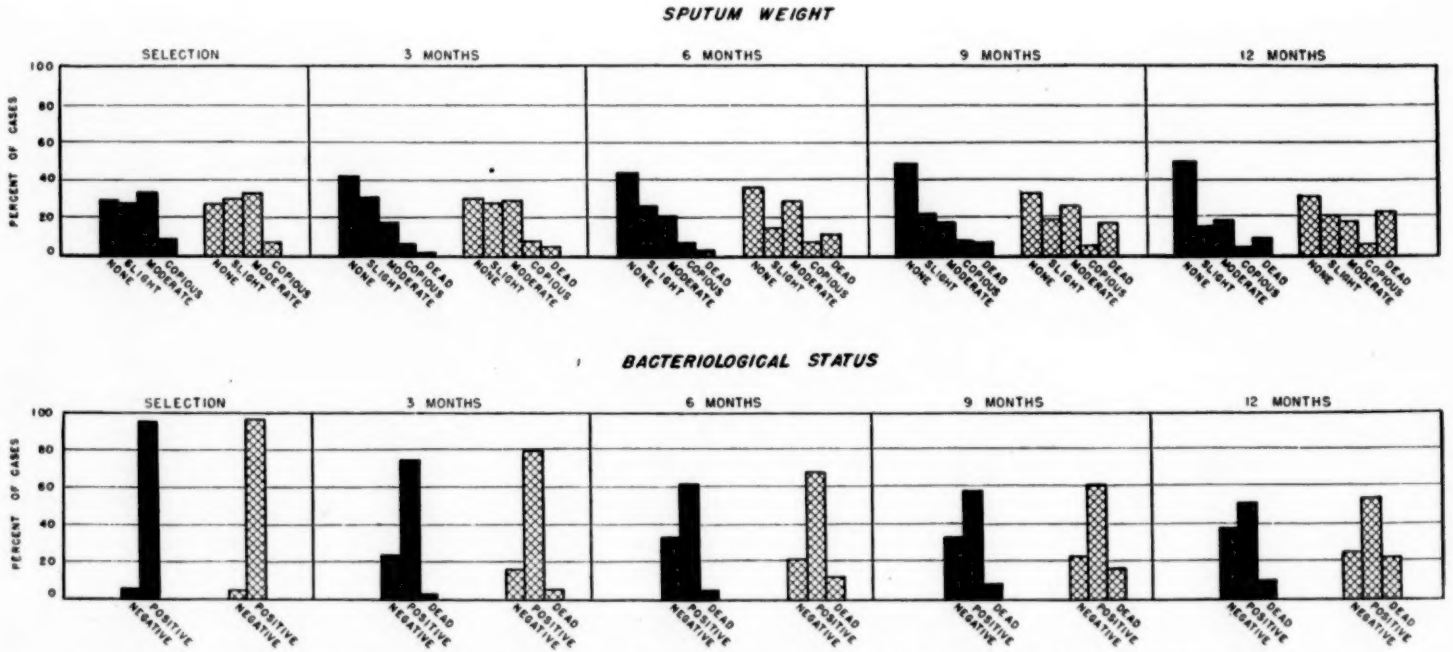

Figure 1. Percentage distribution of streptomycin and control groups according to four clinical measures at each report period.

Table 4. *Percentage distribution of streptomycin and control groups by body weight [1] at each report period*

	Total [2]		Normal or overweight		Underweight		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	24.4	24.6	75.6	75.4		
3 months	100.0	100.0	39.8	33.6	58.6	61.5	1.6	4.9
6 months	100.0	100.0	47.9	33.3	48.7	54.3	3.4	12.4
9 months	100.0	100.0	48.8	37.7	44.7	44.0	6.5	18.3
12 months	100.0	100.0	44.9	35.4	44.9	41.7	10.2	22.9

[1] Based on standard height-weight chart, minus deviation of 10 or more pounds considered underweight.
[2] Based on available observations.

Temperature

Oral afternoon temperatures taken during a 7-day interval at the 3-, 6-, 9-, and 12-month report periods were averaged for each patient. In table 5 and the second section of figure 1, the streptomycin and control patients have been subdivided according to three temperature levels: afrebrile, 98.6° F. or less; slightly febrile, 98.7° to 99.5°; markedly febrile, 99.6° or higher.

While the proportion of the two groups which were markedly febrile at selection is very similar, the streptomycin group dropped sharply at 3 months and remained around the same 5-percent level throughout the year. On the other hand, the controls showed a much slower decrease in the proportion which were markedly febrile, but at the end of 12 months showed fewer with temperatures above 99.6° than the streptomycin group. More accurate comparisons can, perhaps, be made between the "slightly febrile" and "afebrile" proportions in the two groups.

Although similar at selection, the two groups differed markedly in the proportions "slightly febrile" and "afebrile" at subsequent periods. Among those receiving streptomycin, nearly half of the slightly febrile group appeared to have become afebrile by the end of 3 months. No further major changes occurred during the remain-

Table 5. *Percentage distribution of the streptomycin and control groups by temperature [1] at each report period*

	Total [2]		Afebrile		Slightly febrile		Markedly febrile		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	31.5	36.9	50.0	43.9	18.5	19.2		
3 months	100.0	100.0	63.0	45.2	29.8	35.3	5.7	15.1	1.5	4.4
6 months	100.0	100.0	59.3	47.8	31.5	31.2	6.0	9.6	3.2	11.4
9 months	100.0	100.0	63.8	46.9	25.9	27.3	4.3	9.1	6.0	16.7
12 months	100.0	100.0	60.9	47.5	24.8	27.1	4.3	3.3	10.0	22.1

[1] Average oral afternoon temperature for 1 week: afebrile 98.6 or less; slightly febrile 98.7–99.5; markedly febrile above 99.6.
[2] Based on available observations.

der of the year among those receiving streptomycin, The proportion afebrile continued around 60 percent and the proportion slightly febrile, around 25 percent. Loss of fever was much less common among those who did not receive streptomycin, with an increase among the controls in the proportion afebrile of only 10 percent in 12 months, from 37 to 47 percent. But it is interesting that nearly all of this change occurred during the first 3 months, just as in the streptomycin group.

In general, the two groups tended to shift during the year in opposite directions, that is, the slightly febrile cases showed a greater tendency to become afebrile if they were receiving streptomycin, and the markedly febrile cases showed a greater tendency to move into the "dead" category if they were not receiving streptomycin.

Amount of Sputum

Data collected on the daily amount of sputum produced on 7 consecutive days at each report period were averaged for each patient. For simplicity, the average daily amounts were arbitrarily divided into four classes: none—less than 10 grams daily; slight—10 to 29 grams; moderate—30 to 99 grams; and copious—more than 100 grams. The percentage distributions of the streptomycin and control groups at selection and at 3, 6, 9, and 12 months are given in table 6, and the distributions are shown graphically in the third section of figure 1.

At the beginning of the study, the bulk of the cases in both groups were fairly equally distributed between the "none," "slight," and "moderate" categories with only a few cases producing copious amounts of sputum.

By the end of 3 months, however, the streptomycin group had shown a marked increase in the proportion of cases producing virtually no sputum, and that proportion continued to increase throughout the year, although at a slower rate. This increase in the proportion not producing sputum was, of course, accompanied by a decrease in the categories of those producing sputum. Those with moderate amounts of sputum showed the most rapid decrease at the end of 3 months.

Table 6. *Percentage distribution of streptomycin and control groups by amount of sputum [1] at each report period*

	Total [2]		None		Slight		Moderate		Copious		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	28.8	27.2	27.4	30.6	34.8	34.7	9.0	7.5	----	----
3 months	100.0	100.0	42.3	31.6	31.5	27.0	18.5	28.7	6.2	8.2	1.5	4.5
6 months	100.0	100.0	43.9	37.8	26.6	15.6	20.1	28.0	6.1	7.0	3.3	11.6
9 months	100.0	100.0	47.1	34.5	22.0	19.0	18.1	24.5	6.6	4.5	6.2	17.5
12 months	100.0	100.0	50.0	32.0	16.4	20.8	19.2	18.0	4.3	6.7	10.1	22.5

[1] Average daily number of grams for 1 week; none—less than 10; slight—10 to 29; moderate—30 to 99; copious—100 or more.
[2] Based on available observations.

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In the control group there was a much slighter and more gradual increase in the proportion without sputum, and a tendency for cases to move into the "dead" category rather than the improved ratings.

Bacteriological Status

Since bacteriological examinations of patients under study were made with varying frequency in the different hospitals, specimens taken within a broad range on either side of the designated time periods have been considered in the comparison of bacteriological changes in the two groups. When sputum specimens were unavailable for examination, an attempt was made to obtain specimens by gastric lavage. The results of examination of smears were reported, and cultures planted from each specimen. Since adequate growth on a culture was necessary for subsequent sensitivity testing for the streptomycin group, a more intensive effort to obtain positive cultures for the streptomycin cases may have resulted.

Data presented in table 7 and in the fourth section of figure 1 are based on the following interpretation of laboratory results: specimens have been considered positive for tubercle bacilli if either the culture or smear was positive. Thus, the emphasis has been placed on the purity of the negative group, that is, a case has not been regarded as bacteriologically negative if there was any contrary evidence by any method. The few negatives in each group at the beginning of the study represent those for whom a positive smear or culture could not be obtained during the designated observation period at the time the case was selected for study. However, positive bacteriological status had previously been established for these cases just as for all other cases in the study.

Table 7. Percentage distribution of streptomycin and control groups by bacteriological status at each report period

	Total [1]		Negative		Positive		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	3.3	2.6	96.7	97.4	----	----
3 months	100.0	100.0	23.6	16.1	74.9	79.5	1.5	4.4
6 months	100.0	100.0	34.9	21.6	61.9	67.1	3.2	11.3
9 months	100.0	100.0	34.9	22.9	59.1	60.7	6.0	16.4
12 months	100.0	100.0	38.2	24.5	51.9	54.2	9.9	21.3

[1] Based on available observations.

The proportion of both groups for which tubercle bacilli were found declined from nearly 100 percent at the beginning of the study to only about 50 percent at the end of 1 year, although the decrease was more rapid among those receiving streptomycin. In other words, from an original positive bacteriological status, half of both the streptomycin and the control cases were still positive at the end of 12 months. Among those whose positive status changed, four-fifths of

the streptomycin cases and only one-half of the controls had converted their sputum to a negative state, while one-fifth of the streptomycin cases and one-half of the controls in this category had died.

X-ray Change

The methods, terminology, and definitions used for the X-ray evaluation were developed with the assistance of the Evaluation Policy Committee of the Study Section and were tried, amended, and approved by that group before their final use.

The comparison of the two groups of cases presented thus far has been on the basis of objective measurable evidence. The X-ray films, although recognized as probably the most valuable single tool in the study and treatment of tuberculosis, present unique problems for analysis. These difficulties are of several kinds, and the attempts, though imperfect, to deal with each are described.

Unlike the clinical evidence, no measured scale exists for reading X-rays. Serial chest X-rays are usually interpreted only in terms of change from a previous film. The status at selection represents the earliest point from which change in this study can be measured. However, status at selection is not the same for all cases, and, even though not satisfactorily measurable, can be assumed to cover a scale ranging from one extreme to the other. Certainly, it is reasonable to assume that the potentialities for improvement or for deterioration are affected by the position on the scale occupied by any particular case at the time of selection for study. Some clues as to the distribution of the two groups of cases may be obtained from certain descriptive judgments about each case on the basis of the clinical and X-ray data available at the time the case was selected for study. The data on predominant morphology, cavitation, dynamics, and course presented in table 1 give an indication of the factors influencing the distribution of the two groups of cases and establish a crude base line against which future change can be measured.

In this analysis, the existence of disagreement in the interpretation of films has been recognized and an attempt has been made to minimize its effect upon the results. Clinicians with wide experience both in the management of tuberculous patients and in the interpretation of X-ray films were asked to participate as evaluators or jurors in the X-ray evaluation of the case material, to translate a combination of shadows on the film into an opinion of the significance of those shadows. The complete task of evaluation was accomplished in a series of five panels of 2 days each. Each case reviewed at a given panel was assigned to four evaluators selected at random from the panel of eight. Each saw the same number of streptomycin cases as of control cases. He read each case independently and without knowing whether the films were of a streptomycin or a control case.

Four factors were introduced into the evaluation in an attempt to narrow the range of the inherent subjective element. First, the terminology in which judgments were expressed was prescribed and defined. Second, judgments were made separately for the upper, middle, and lower thirds of each lung, to localize the area covered by the opinion. Third, the length of time between the selection and subsequent film was not known by the evaluators; thus, judgments of the amount of change were not influenced by knowledge of the time in which it occurred. Fourth, X-ray judgments independent of any knowledge of the clinical course were made, as well as subsequent opinions based on all the material available. The analysis presented in this preliminary paper is based on judgments of X-rays only.

Comparison of the four opinions of X-ray change on each case revealed a lack of agreement on a large number of cases. Although disagreement was slight for many cases, there were other cases for which all four doctors gave different opinions, as well as cases rated at opposite ends of the scale by different doctors.

The nature of the case material, the type of question, and the area of the lungs are among the factors being analyzed for later presentation with respect to the nature and extent of the disagreement.

The present paper does not deal at any length with the problem of disagreement but takes cognizance only of its existence as a factor complicating the analyses. Since the scale of change is not a numerical one, it is not possible to average the four independent opinions on each case to arrive at a case opinion. Therefore, in this paper, the simple summations of all judgments (four for each case) are presented for each group in table 8, figure 2, and appendix table 3. The percentage distributions of these judgments are then taken as summaries of the change in status of the treated and control groups.

Table 8. *Percentage distribution of opinions of X-ray changes in the streptomycin and control groups at each report period by degree of change*

Change from selection to:	Total [1]	Degree of change							
		Improvement			No change	Deterioration			
		Marked	Moderate	Slight		Slight	Moderate	Marked	Dead
Streptomycin group									
3 months	100.0	7.1	25.0	37.3	15.9	7.4	3.9	1.8	1.6
6 months	100.0	12.8	29.1	29.7	8.9	7.4	4.9	3.9	3.3
9 months	100.0	16.1	28.6	23.0	9.1	7.5	5.3	4.0	6.4
12 months	100.0	18.1	27.2	22.7	6.9	6.0	4.5	4.4	10.2
Control group									
3 months	100.0	2.0	8.9	26.5	25.1	16.9	10.1	5.9	4.6
6 months	100.0	3.4	12.8	26.5	15.6	12.4	10.7	6.7	11.9
9 months	100.0	6.0	15.4	24.0	10.2	9.4	11.0	6.5	17.5
12 months	100.0	7.4	17.4	19.2	8.4	9.4	8.1	7.7	22.4

[1] Based on available opinions.

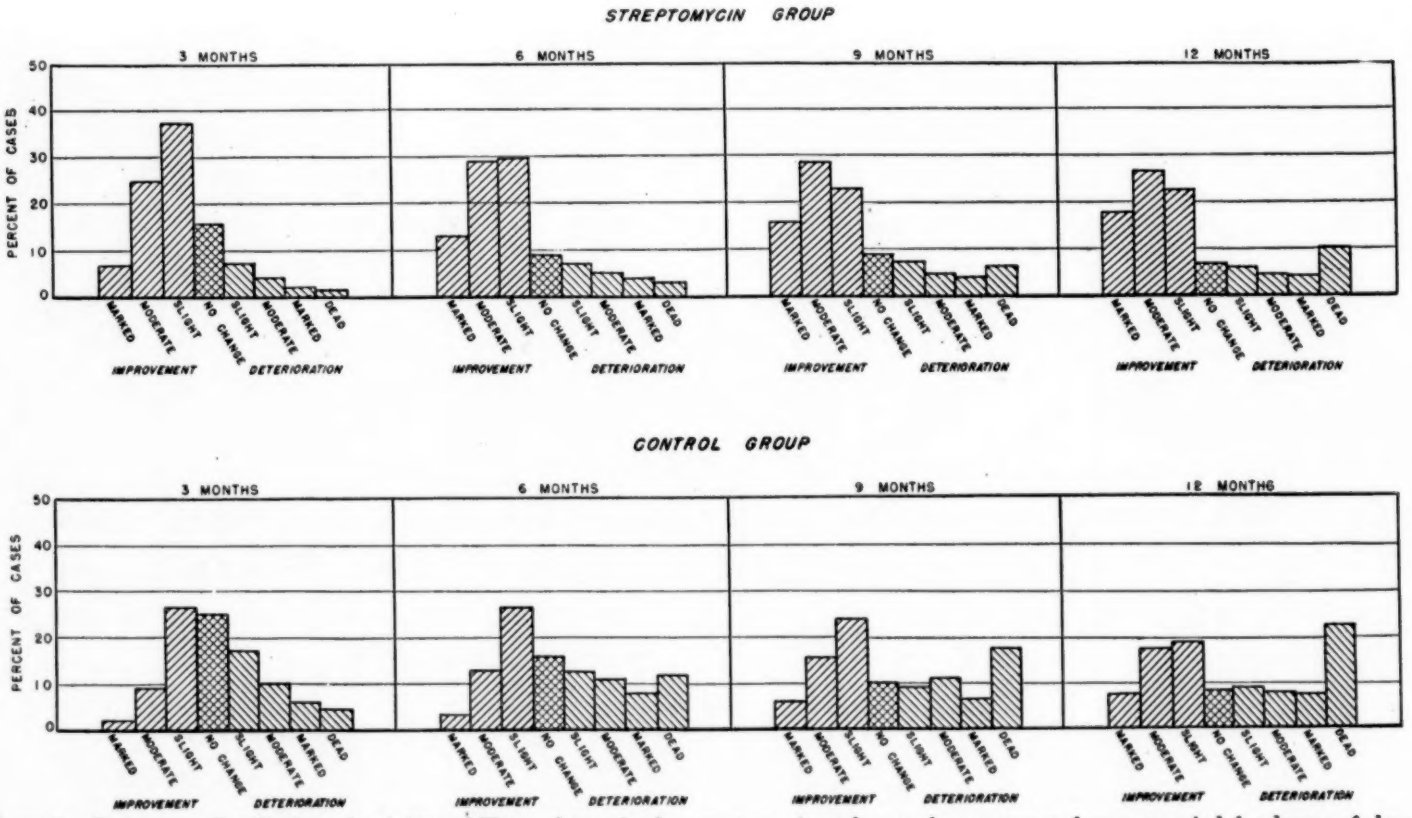

Figure 2. Percentage distribution of opinions of X-ray change in the streptomycin and control groups at each report period, by degree of change.

In a consideration of X-ray change, all cases in the streptomycin and control groups may be thought of as beginning the year of observation at the midpoint of the figure. The possibilities for change with time are in two directions: improvement of the disease shows on the right side of the chart as three degrees of getting better, and worsening of the disease shows on the left side of the chart as four degrees of getting worse. Death has been classified as the ultimate, or fourth degree, in worsening. This midpoint from which the two groups dispersed during the period of study is designated in the histograms as the "no change" point.

Inspection at the end of 3 months shows nearly seven-tenths of the streptomycin group improved to varying degrees, and the remaining three-tenths about equally divided between those remaining unchanged and those moving into the "worse" categories. The controls, on the other hand, showed equal proportions getting better and getting worse and one-quarter remaining unchanged at the end of 3 months.

After 6 months, again about seven-tenths of the streptomycin group were better, although now there was a greater concentration of patients in the more marked degrees of improvement than at 3 months. But of the remaining three-tenths of the streptomycin group, only one-tenth remained at the "no change" point while two-tenths were worse than at the beginning. The controls, at 6 months, continued to be equally dispersed on both sides of the "no change" point, although the size of the "no change" group decreased slightly as equal proportions improved or deteriorated.

At 9 months, the streptomycin group presented substantially the same picture as at 6 months, about seven-tenths better, one-tenth unchanged, and two-tenths worse. The controls continued their slower rate of change and by 9 months also showed only one-tenth still in the "unchanged" group. However, the movement from the "no change" group in the controls was again almost equally divided between the better and worse categories.

At the end of 12 months, the distribution for the streptomycin group was practically unchanged, nearly seven-tenths improved, less than one-tenth unchanged, and slightly more than two-tenths worse. Among the controls, the size of the "unchanged" group was, as at 9 months, approximately the same as in the streptomycin group, and roughly 45 percent of the cases were better and 45 percent worse.

The data on these four time periods might be summarized thus: in the streptomycin group, about seven-tenths of the group had improved by the end of 3 months. Within this improved group there was, during the 6-, 9-, and 12-month periods, a gradual shift to the right—that is, continued improvement. The proportion showing no change from the beginning of the study decreased from 16 percent at 3 months to about 7 percent at the end of 12 months. The proportion

showing deterioration increased very slowly as the "no change" group decreased.

Among the controls, change was much slower and less dramatic. At the end of 3 months, one-quarter of the controls were still unchanged, with a gradual decline to about one-tenth still unchanged at the end of 1 year.

The controls are noteworthy, however, for the equality of movement toward improvement and deterioration. For all four time periods, about the same proportion of the controls was in the "better" categories as in the "worse" categories. However, when the degree of improvement or deterioration is considered, controls showing deterioration at 3 months showed a greater tendency to continue getting worse than for controls beginning to improve to continue improving.

The material in table 8 may be used in a slightly different way to compare the streptomycin and control groups. If the percentages in the marked and moderate X-ray improvement columns of the lower section of table 8 are combined, the two groups may be compared with respect to the proportions who improved significantly. In the streptomycin group, the percentages are 32, 42, 45 and 45, for the 3-, 6-, 9-, and 12-month periods, respectively. In the control group, the percentages are 11, 16, 21, and 25 for the 3-, 6-, 9-, and 12- month periods, respectively. The proportion in which significant X-ray improvement occurred from selection is considerably greater at every period among those receiving streptomycin, but it is interesting that with the passage of time there is a decrease in the ratio between the two groups. While almost three times as many streptomycin as control cases had shown significant X-ray improvement at the end of 3 months, the superiority gradually decreases until at 12 months there are not quite twice as many such cases among those who received streptomycin. The more favorable position of the streptomycin group seems due to an advantage gained during the actual period of drug therapy, the first 3 months.

Some indication of the nature of the differences in the X-ray changes in the two groups may be obtained by subdividing the groups according to the opinions on predominant morphology, dynamic status, and course of disease at the time of selection. Judgments on these points were not made retroactively on the basis of the behavior of a case, but instead were based only on the information available at the time each case was selected for study. This method of classification, while lacking the wisdom of hindsight, has the very practical advantage of coinciding with the basis on which such judgments must, of necessity, be made in the daily management of tuberculous cases. Thus, a case in which the disease appeared to be predominantly exudative at selection may have responded to therapy in such a fashion that "caseous" might have been a more appropriate initial classification.

Such cases undoubtedly existed in both the streptomycin and control groups. Yet it is of some interest to know what happened to cases which appeared initially to be predominantly exudative, or caseous, or fibrotic.

Table 9 and figures 3, 4, and 5 show the percentage distributions of the streptomycin and control groups over the scale of X-ray change at 12 months, within each classification of predominant morphology, dynamic status, and course of disease at selection. Comparison of the histograms in the first row in figure 3, showing the morphological categories in the streptomycin group, indicates more or less similar distributions of X-ray change for the exudative and caseous cases at the end of 1 year, with the exception of deaths, where the rate was almost twice as high for the caseous as for the exudative cases. The fibrotic cases differed from the others at both ends of the scale: fewer were markedly worse or dead and fewer were greatly improved; a much higher proportion remained stationary during the year.

In the second row of histograms, which shows the distributions in the control group, the similarity between the status of exudative and caseous cases at the end of the year is less marked. The exudative cases tended to shift to the significantly improved categories and the caseous cases to deteriorate. The fibrotic control cases showed much less movement from the no-change point in either direction than either the exudative or caseous cases. While a higher proportion of the fibrotic cases died than improved markedly, it is interesting that among the control group, nearly as many of the fibrotic cases showed marked improvement as of the exudative and caseous cases.

When each morphological class in the streptomycin group in the first row of histograms is compared with its counterpart among the controls in the second row, the streptomycin cases showed greater improvement for all three categories. The greatest differences between those who received streptomycin and those who did not appear to be among the predominantly fibrotic cases. However, this finding is based on extremely few observations and is at variance with impressions of many workers. Therefore, it must be investigated further on a larger body of material.

In the second section of table 9 and in figure 4, the streptomycin and control groups have been subdivided on the basis of dynamic status at time of selection, and the distributions of opinions of X-ray change at 12 months are shown separately for the acute, subacute, and chronic cases in the two groups. The relative positions of the three classes are very much the same for both groups. Judged by the proportion showing no X-ray change at the end of the year's observation, the tendency to move in one direction or the other was most marked among the acute cases in both the streptomycin and control groups. However, when the direction of change is considered,

Table 9. *Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by predominant morphology, dynamic status, and course of disease at selection*

Degree of X-ray change	Predominant morphology					
	Exudative		Caseous		Fibrotic	
	Sm	Control	Sm	Control	Sm	Control
Total [1]	100.0	100.0	100.0	100.0	100.0	100.0
Improvement:						
Marked	19.8	8.9	19.4	6.5	7.8	6.0
Moderate	27.3	21.5	27.3	15.2	26.5	12.1
Slight	24.8	21.8	19.7	17.1	27.5	18.2
No change	4.3	7.5	6.3	6.2	17.7	18.2
Deterioration:						
Slight	5.6	7.8	5.8	8.7	7.8	16.2
Moderate	6.5	5.5	2.5	9.9	5.9	10.1
Marked	4.0	6.5	5.1	8.7	2.9	8.1
Dead	7.7	20.5	13.9	27.7	3.9	11.1

Degree of X-ray change	Dynamic status					
	Acute		Subacute		Chronic	
	Sm	Control	Sm	Control	Sm	Control
Total [1]	100.0	100.0	100.0	100.0	100.0	100.0
Improvement:						
Marked	19.7	7.3	17.8	7.7	15.8	7.1
Moderate	25.2	16.8	30.4	19.6	24.2	14.2
Slight	19.4	15.7	23.1	22.8	27.9	18.7
No change	2.6	3.6	7.6	8.1	13.9	17.4
Deterioration:						
Slight	6.7	6.2	5.0	8.8	6.7	16.1
Moderate	5.7	8.8	3.8	7.4	3.6	8.4
Marked	6.7	7.7	2.9	8.4	3.0	6.5
Dead	14.0	33.9	9.4	17.2	4.9	11.6

Degree of X-ray change	Course of disease					
	Progressive		Stationary		Retrogressive	
	Sm	Control	Sm	Control	Sm	Control
Total [1]	100.0	100.0	100.0	100.0	100.0	100.0
Improvement:						
Marked	20.2	6.4	13.7	8.0	10.0	14.0
Moderate	27.9	17.7	25.9	14.9	22.5	22.8
Slight	19.3	17.5	27.9	22.9	45.0	21.1
No change	4.3	6.2	14.2	14.3	10.0	7.0
Deterioration:						
Slight	6.0	7.2	6.6	13.8	2.5	12.3
Moderate	5.0	8.3	3.6	6.9	2.5	10.5
Marked	5.1	7.9	2.0	9.6	5.0	
Dead	12.2	28.8	6.1	9.6	2.5	12.3

[1] Based on available opinions.

the subacute cases showed the highest percent with any improvement; the chronic cases were second, and acute cases, third. The death rate was highest among the acute cases, second among the subacute, and lowest among the chronic cases.

Although the three subdivisions of the streptomycin group according

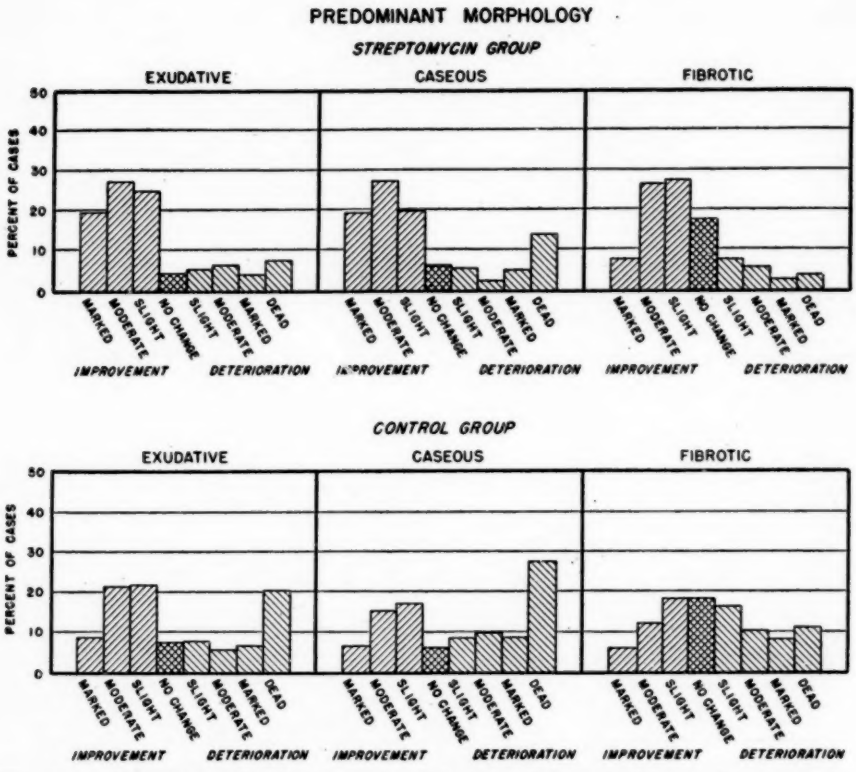

Figure 3. Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by predominant morphology at selection.

to dynamic status differ from each other in very much the same way as their counterparts among the controls, there are differences between the streptomycin and control members of each pair. This may be seen visually by pairing vertically the histograms in the two rows of figure 4. The effect of streptomycin appears to be most striking among the acute cases. The death rate was two and one-half times as high among the acute cases who had not received streptomycin (33.9 percent) as among those who had been treated with the drug (13.7 percent), while the proportion of those showing X-ray improvement was only slightly more than one-half as large. The subacute and chronic cases who received streptomycin also showed a lower death rate and a larger proportion improved, but the contrasts were not so sharp.

Figure 5 and the third section of table 9 show the distribution of opinions on X-ray change at 12 months in the streptomycin and control groups after the two groups of cases have been subdivided according to course of disease at time of selection for study. The histograms for the "progressive" cases in both the streptomycin and control groups

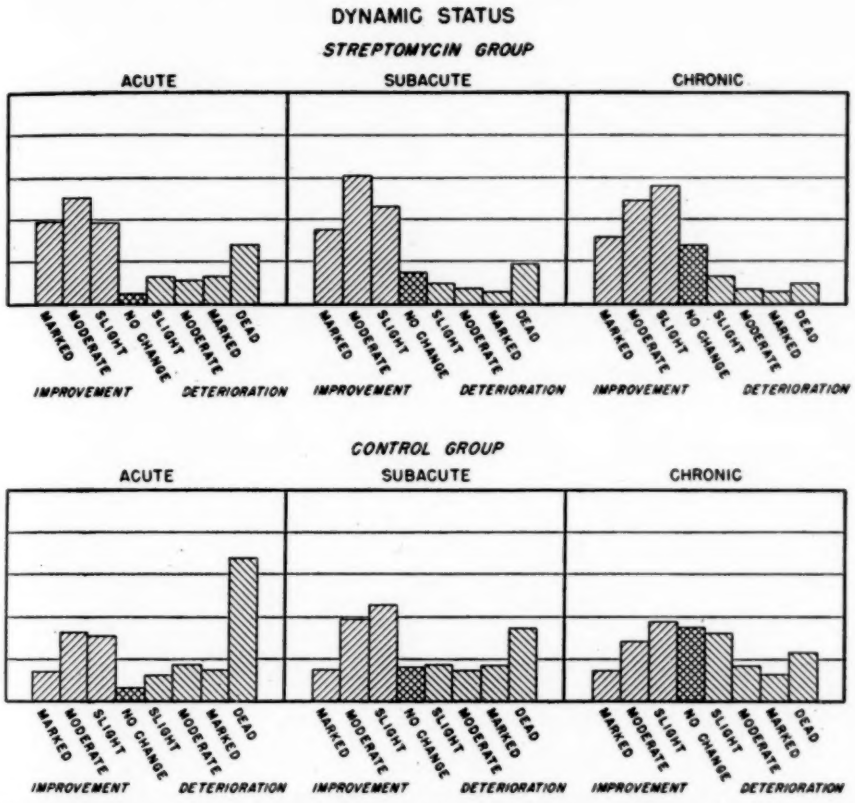

Figure 4. Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by dynamic status at selection.

are almost identical with those shown above for acute cases, and the distributions for "stationary" cases correspond closely with those for chronic cases above. While a larger proportion of the stationary cases in both groups improved than of the progressive cases, differences between those who received streptomycin and those who did not are more marked for the progressive cases because of the large proportion of deaths in the progressive controls. The retrogressive groups are too small to provide definitive comparisons.

Discussion

This cooperative study has demonstrated the value of the addition of streptomycin to other therapy in pulmonary tuberculosis. The results of the controlled investigation show that during the 12 months of observation, greater improvement occurred among the patients who received streptomycin in addition to other forms of therapy. The differences between the streptomycin and control groups are very marked with respect to both the time factor and extent. By the

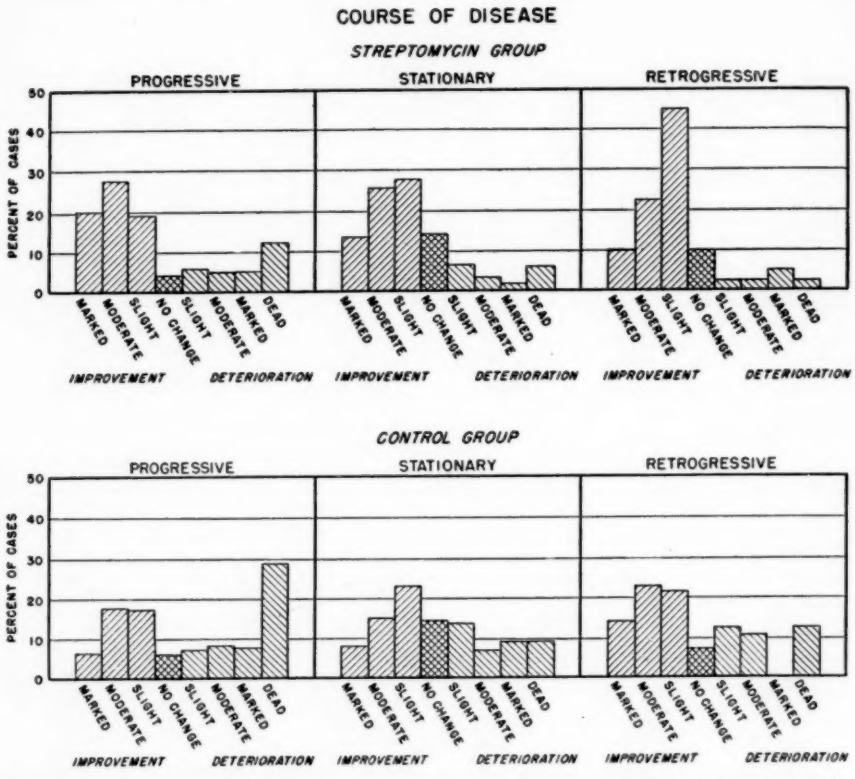

Figure 5. Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by course of disease at selection.

end of 3 months, a large proportion of the cases receiving streptomycin had improved as compared with a much smaller proportion of those who received only conventional therapy. Additional cases in each group showed improvement at the end of 6-, 9-, and 12-month observations. Although the differences between the two groups decrease with the passage of time, the control group never overcomes the advantage gained by the streptomycin group during the first 3 months, and the superiority of those who received streptomycin is still marked at the end of 12-months' observation.

Even though the findings are based on relatively small numbers for many of the subdivisions of the material, the consistent superiority of the streptomycin group on all measures, clinical, bacteriological, and radiological, and at all points in time, constitutes definitive evidence of the usefulness of streptomycin when added to other treatment of pulmonary tuberculosis. The possible bias which exists in the analysis because of treatment of the lost cases was mentioned earlier in the paper. It should, perhaps, be pointed out that although

this bias favored the control group, the results showed the streptomycin group consistently superior on all measures. Therefore, it is evident that the differences between the two groups have not been produced by the bias, but that the true differences are probably somewhat larger.

A theory developed and presented in connection with the interpretation of tuberculin sensitivity may be applied in a slightly different way to this material. The concept was presented that a given population may consist of two distinct components distributed in such a fashion that there is an overlapping which produces a doubtful group. A population of tuberculous patients might also be thought of as having two quite separate components and a third group lying midway between, with respect to inherent constitutional factors influencing the course of the disease. In figures 1 and 2, a certain pattern of change can be observed over and over: both the streptomycin and control groups move away from the "no change" or starting point toward the two extremes with the passage of time. The material suggests the possibility that, even at the beginning of the investigation, there were certain cases among those studied which, it will be recalled, included only moderately and far advanced cases which were going to improve and certain others which were going to deteriorate, while for a third group, the "doubtful" cases, the direction of change was in the balance.

One interpretation of these findings might be that the superiority of the streptomycin cases has been produced by a quite different action of the drug on the three groups. For those who were going to improve, the rate of improvement appeared to have been accelerated by the addition of streptomycin. For those who were going to become worse streptomycin slowed the rate of deterioration and delayed death. Finally, the possible result of streptomycin in the "doubtful" group may be considered. In these cases, it could be that the factors of host resistance and conventional therapy were so closely matched against the severity of the infection that the outcome was in doubt. The addition of the drug could have swung the balance with the result that these "doubtful" cases in the streptomycin group improved, while among their counterparts in the control group some improved and some deteriorated. A clearer understanding of the nature of the "doubtful" cases for which streptomycin may be the decisive factor may emerge from further analysis of the material.

Summary

A group investigation under the direction of the Tuberculosis Study Section of the Division of Research Grants and Fellowships to determine the effect of adding streptomycin to other therapy in

pulmonary tuberculosis was concluded in March 1950. Tuberculosis clinicians in 12 hospitals in different parts of the country carried out a joint investigation by managing their cases under a common protocol. Five hundred and forty-one cases of pulmonary tuberculosis were divided at random into two groups for which all forms of conventional therapy or surgery were permissible. The variable under investigation, streptomycin, was given only to one group.

The two groups have been compared in this first paper on only the most important measures of change; later reports will contain material on bacterial resistance and toxicity in the streptomycin group. The principal findings may be summarized:

1. At the beginning of the study, the two groups were similar.

2. By the end of 3 months, the length of drug therapy, improvement had occurred in a much larger proportion of the streptomycin group.

3. At each succeeding point in time at which the two groups were compared, the superiority of the streptomycin group was marked, although the differences between the two groups became somewhat smaller.

4. The more favorable position of the cases who received streptomycin is evident for all measures on which the two groups were compared, namely, temperature, body weight, bacteriological status, amount of sputum and X-ray change.

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APPENDIX

Table 1. *Initial characteristics of cases under observation at each report period (percent of group)*

Characteristics and treatment		Selection		3 months		6 months		9 months		12 months	
		Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Race	White	59.6	62.0	59.2	61.1	59.5	60.4	58.2	58.6	58.0	58.7
	Nonwhite	40.4	38.0	40.8	38.9	40.5	39.6	41.8	41.4	42.0	41.3
Sex	Male	53.0	53.1	53.1	54.1	52.5	54.2	52.0	53.6	51.3	53.1
	Female	47.0	46.9	46.9	45.9	47.5	45.8	48.0	46.4	48.7	46.9
Age	Under 25	27.0	28.4	27.5	27.6	27.6	28.3	28.7	30.0	30.1	28.6
	25–44	54.8	51.3	54.2	51.8	54.5	50.4	53.7	50.0	53.5	52.0
	45 and over	18.2	20.3	18.3	20.6	17.9	21.3	17.6	20.0	16.4	19.4
Length of present hospitalization	Less than 3 months	63.6	55.0	62.5	56.0	62.5	55.4	61.7	55.4	62.8	58.2
	3–5 months	12.6	16.2	13.0	16.7	12.9	17.1	12.3	16.8	12.4	13.8
	6–11 months	15.6	16.6	16.1	14.8	16.0	14.6	16.9	15.5	15.5	15.8
	1 year or more	8.2	12.2	8.4	12.5	8.6	12.9	9.1	12.3	9.3	12.2
Temperature	Markedly febrile	18.5	19.2	19.1	19.1	19.5	18.7	20.1	18.2	20.8	18.4
	Slightly febrile	50.0	43.9	50.4	43.9	50.5	44.2	51.6	45.9	52.7	44.4
	Afebrile	31.5	36.9	30.5	37.0	30.0	37.1	28.3	35.9	26.5	37.2
Body weight	Normal or overweight	24.4	24.6	24.5	25.0	24.2	24.9	23.7	25.1	23.3	20.3
	Underweight	75.6	75.4	75.5	75.0	75.8	75.1	76.3	74.9	76.7	79.7
Amount of sputum	None	28.8	27.2	28.6	26.7	28.0	27.3	27.8	27.5	26.9	24.7
	Slight	27.4	30.6	27.0	30.2	27.5	30.7	26.6	29.8	27.3	29.9
	Moderate	34.8	34.7	35.1	35.3	35.4	34.4	36.5	35.3	35.9	37.1
	Copious	9.0	7.5	9.3	7.8	9.1	7.6	9.1	7.4	9.9	8.3
Previous streptomycin therapy.	Streptomycin	4.4	3.3	4.6	3.1	4.7	3.3	4.9	3.6	5.3	4.1
	No streptomycin	95.6	96.7	95.4	96.9	95.3	96.7	95.1	96.4	94.7	95.9
Surgery or collapse procedures in effect.[1]	None	79.2	73.0	78.0	71.5	77.2	69.3	76.1	66.2	76.3	64.5
	Pneumothorax	8.0	8.6	8.7	8.7	9.1	9.2	9.4	10.4	9.0	11.0
	Pneumoperitoneum	9.1	10.1	9.5	10.7	9.8	11.4	10.2	12.9	10.4	14.0
	Thoracoplasty	2.2	6.1	2.3	6.7	2.4	7.5	2.6	7.5	2.4	7.0
	Phrenic nerve operation	1.5	2.2	1.5	2.4	1.5	2.6	1.7	3.0	1.9	3.5
Stage of disease	Moderately advanced	34.3	34.7	33.8	34.3	33.3	34.9	33.3	34.6	31.7	31.5
	Far advanced	65.7	65.3	66.2	65.7	66.7	65.1	66.7	65.4	68.3	68.5
Predominant morphology.	Exudative	38.7	41.2	38.4	40.8	37.9	40.0	37.9	39.4	38.2	39.9
	Caseous	48.6	44.7	48.7	44.6	49.3	45.3	48.9	46.4	49.5	45.8
	Fibrotic	12.7	14.1	12.9	14.6	12.8	14.7	13.2	14.2	12.3	14.3
Dynamics	Acute	36.5	35.8	37.0	35.7	36.9	35.5	37.2	35.6	38.7	37.2
	Subacute	41.4	42.3	40.7	42.1	40.9	42.0	41.1	42.8	41.6	41.0
	Chronic	22.1	21.9	22.3	22.2	22.2	22.5	21.7	21.6	19.7	21.8
Course	Progressive	68.8	63.5	69.5	63.8	69.7	63.6	69.6	64.4	71.0	64.9
	Stationary	25.4	28.1	24.4	27.9	24.6	27.7	24.4	26.8	23.8	26.7
	Retrogressive	5.8	8.4	6.1	8.3	5.7	8.7	6.0	8.8	5.2	8.4
Cavitation	Definitely present	83.5	84.8	16.3	14.5	16.2	14.1	15.8	13.7	14.7	14.5
	Not present	16.5	15.2	83.7	85.5	83.8	85.9	84.2	86.3	85.3	84.5

[1] Cases receiving more than one form of surgery or collapse procedure are duplicated.

APPENDIX—Continued

Table 2. *Actual distribution of streptomycin and control cases at each report period*

A. TEMPERATURE

	Total		Afebrile		Slightly febrile		Markedly febrile		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	85	100	135	119	50	52	----	----	----	----
3 months	270	271	165	114	78	89	15	38	4	11	8	19
6 months	270	271	147	109	78	71	15	22	8	26	22	43
9 months	270	271	148	98	60	57	10	19	14	35	38	62
12 months	270	271	128	86	52	49	9	6	21	40	60	90

B. BODY WEIGHT

	Total		Normal or overweight		Underweight		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	63	60	195	184	----	----	12	27
3 months	270	271	97	76	143	139	4	11	26	45
6 months	270	271	112	70	114	114	8	26	36	61
9 months	270	271	106	72	97	84	14	35	53	80
12 months	270	271	92	62	92	73	21	40	65	96

C. AMOUNT OF SPUTUM

	Total		Very slight		Slight		Moderate		Copious		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	77	73	73	82	93	93	24	20	----	----	3	3
3 months	270	271	110	77	82	66	48	70	16	20	4	11	10	27
6 months	270	271	107	85	65	35	49	63	15	16	8	26	26	46
9 months	270	271	107	69	50	38	41	49	15	9	14	35	43	71
12 months	270	271	104	57	34	37	40	32	9	12	21	40	62	93

D. BACTERIOLOGICAL STATUS

	Total		Negative		Positive		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	9	7	260	258	----	----	1	6
3 months	270	271	61	40	194	198	4	11	11	22
6 months	270	271	88	50	156	155	8	26	18	40
9 months	270	271	81	49	137	130	14	35	38	57
12 months	270	271	81	46	110	102	21	40	58	83

APPENDIX—Continued

Table 3. *Actual distribution of opinions of X-ray change in the streptomycin and control groups at each report period by degree of change*

Change from selection to:	Total	Degree of change								Not available
		Improvement			No change	Deterioration				
		Marked	Moderate	Slight		Slight	Moderate	Marked	Dead	
Streptomycin group										
3 months	1,080	72	252	376	161	75	39	18	16	71
6 months	1,080	122	278	284	85	71	47	37	32	124
9 months	1,080	141	251	202	80	66	47	35	56	202
12 months	1,080	149	223	186	57	49	37	36	84	259
Control group										
3 months	1,084	19	85	254	240	162	97	56	44	127
6 months	1,084	30	112	233	137	109	94	59	104	206
9 months	1,084	48	123	192	82	75	88	52	140	284
12 months	1,084	53	124	137	60	67	58	55	160	370

Table 4. *Actual distribution of opinions on degree of X-ray change in the streptomycin and control groups at the end of 12 months classified by predominant morphology, dynamic status and course of disease at selection*

Degree of X-ray change	Predominant morphology							
	Total		Exudative		Caseous		Fibrotic	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Total	1,080	1,084	418	447	525	484	137	153
Improvement:								
Marked	149	53	64	26	77	21	8	6
Moderate	223	124	88	63	108	49	27	12
Slight	186	137	80	64	78	55	28	18
No change	57	60	14	22	25	20	18	18
Deterioration:								
Slight	49	67	18	23	23	28	8	16
Moderate	37	58	21	16	10	32	6	10
Marked	36	55	13	19	20	28	3	8
Dead	84	160	25	60	55	89	4	11
Not available	259	370	95	154	129	162	35	54

Degree of X-ray change	Dynamic status							
	Total		Acute		Subacute		Chronic	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Total	1,080	1,084	394	388	447	459	239	237
Improvement:								
Marked	149	53	62	20	61	22	26	11
Moderate	223	124	79	46	104	56	40	22
Slight	186	137	61	43	79	65	46	29
No change	57	60	8	10	26	23	23	27
Deterioration:								
Slight	49	67	21	17	17	25	11	25
Moderate	37	58	18	24	13	21	6	13
Marked	36	55	21	21	10	24	5	10
Dead	84	160	44	93	32	49	8	18
Not available	259	370	80	114	105	174	74	82

Table 4. *Actual distribution of opinions on degree of X-ray change in the streptomycin and control groups at the end of 12 months classified by predominant morphology, dynamic status and course of disease at selection*—Continued

Degree of X-ray change	Course							
	Total		Progressive		Stationary		Retrogressive	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Total	1,080	1,084	743	688	274	305	63	91
Improvement:								
Marked	149	53	118	30	27	15	4	8
Moderate	223	124	163	83	51	28	9	13
Slight	186	137	113	82	55	43	18	12
No change	57	60	25	29	28	27	4	4
Deterioration:								
Slight	49	67	35	34	13	26	1	7
Moderate	37	58	29	39	7	13	1	6
Marked	36	55	30	37	4	18	2	
Dead	84	160	71	135	12	18	1	7
Not available	259	370	159	219	77	117	23	34

—Announcement—

Handbook for Photofluorographic Operators

When the Brazilian, DeAbreu, first demonstrated the mass use of photofluorography in 1938, the world little imagined that the brief span of 12 years would see it grow to its present usefulness. During the one year of 1949, more than 14 million persons in the United States alone were screened for tuberculosis by chest photofluorography, and mass survey activities are continuing to expand all over the country.

As a means of facilitating its own part in the vast tuberculosis case-finding program of today, the Public Health Service, through its Division of Tuberculosis, has produced a "Handbook for Photofluorographic Operators" as a technical guide for its own photofluorographic field teams. The publication outlines the principles of photofluorography in simple terms, describes the components and characteristics of photofluorographic machines, and presents detailed operating instructions for the most commonly used types of equipment. Photofluorographic film processing instructions are also given, as well as directions for adjusting and testing equipment. The final chapter of the handbook discusses the all-important subject of radiation hazards and protective measures. Illustrations are numerous and include both photographs and schematic diagrams of photofluorographic equipment.

Although the manual has been written expressly for the use of Public Health Service photofluorographic personnel, it will serve as a useful reference guide for all users and operators of photofluorographic equipment. Copies are now available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 45 cents each.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports From States for Week Ended October 14, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 1,598, a 12 percent decrease from the 1,815 cases reported for the preceding week. This is the third consecutive week since May 20 that a decrease from the preceding week has been reported. The figure for this week is higher than the corresponding number (1,204) for 1949. The peak incidence of this disease to date occurred the week ended September 23, the latest week in any year during the past 20 years, with the exception of 1932.

The cumulative total of 23,815 for the current "disease" year was below the corresponding total of 35,000 for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the calendar year was 24,947, compared with the total of 35,913 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Oct. 14, 1950	Oct. 15, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	3	----	(1)	(1)	(1)	(1)	(1)	36	41	(1)
Diphtheria (055)	171	241	341	27th	1,347	1,968	2,507	4,475	5,736	8,804
Acute infectious encephalitis (082)	27	19	10	(1)	(1)	(1)	(1)	763	632	515
Influenza (480–483)	1,668	1,082	1,473	30th	11,077	8,072	8,531	257,336	83,939	150,301
Measles (085)	698	605	814	35th	3,606	3,132	3,725	291,777	591,650	556,638
Meningococcal meningitis (057.0)	69	49	58	37th	226	189	189	3,025	2,705	2,823
Pneumonia (490–493)	895	1,066	----	(1)	(1)	(1)	(1)	66,780	62,765	----
Acute poliomyelitis (080)	1,598	1,204	1,042	11th	[2]23,815	35,000	20,219	[2]24,947	35,913	20,686
Rocky Mountain spotted fever (104)	10	6	6	(1)	(1)	(1)	(1)	441	541	526
Scarlet fever (050)	659	790	963	32d	3,576	3,878	4,778	43,746	61,544	66,773
Smallpox (084)	----	----	----	35th	1	3	4	27	44	151
Tularemia (059)	6	15	15	(1)	(1)	(1)	(1)	745	935	784
Typhoid and paratyphoid fever (040, 041) [3]	76	76	98	11th	2,332	2,794	2,794	2,842	3,282	3,282
Whooping cough (056)	1,328	1,289	1,435	39th	2,905	2,809	3,024	100,100	49,411	78,899

[1] Not computed. [2] Deductions: Michigan, weeks ended September 2, and October 7, 1 case each.
[3] Including cases reported as salmonellosis.

For the current week, seven of the total of nine geographic divisions decreased from the preceding week. These decreases ranged from 114 (440 to 326) cases of acute poliomyelitis reported in the Middle Atlantic States to 1 (95 to 94) in the West South Central States. The East South Central States increased 1 case (91 to 92) and the Mountain States increased by 33 (28 to 61).

For the current week, the States reporting the largest number of cases were: New York (205), Ohio (125), Michigan (115), Illinois (100), Pennsylvania (77), and Maryland and Texas (70 each).

Alaska reported 9 cases compared with 16 last week. The cumulative total for the calendar year was 40. Hawaii reported 1 case for the week.

For the Nation, the total number of reported cases of scarlet fever for the current week was 659 which may be compared with 586 cases reported last week, and 790 cases reported for the corresponding week last year. The 5-year (1945–49) median was 963 cases.

The cumulative total number of reported cases of scarlet fever for the current "disease" year was 3,576 which may be compared with 3,878 for the corresponding period last year and 4,778 for the 5-year median. This is the lowest cumulative total number of cases of scarlet fever reported for corresponding periods since the "disease" year beginning in 1943.

The total number of cases of meningococcal meningitis reported for the week was 69 compared with 44 last week and 49 for the corresponding period last year. For the calendar year, a total of 3,025 cases was reported, the highest total number reported for corresponding periods in the past 3 years.

No smallpox was reported in the United States. Three cases of anthrax were reported, one in New Jersey and two in Pennsylvania.

Deaths During Week Ended October 14, 1950

	Week ended October 14, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 931	8, 750
Median for 3 prior years	8, 750	----------
Total deaths, first 41 weeks of year	375, 641	375, 626
Deaths under 1 year of age	577	668
Median for 3 prior years	668	----------
Deaths under 1 year of age, first 41 weeks of year	25, 495	26, 851
Data from industrial insurance companies:		
Policies in force	26, 552, 365	70, 084, 532
Number of death claims	8, 345	9, 423
Death claims per 1,000 policies in force, annual rate	6. 3	7. 0
Death claims per 1,000 policies, first 41 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended October 14, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**171**	**27**	**1,668**	**698**	**69**	**895**	**1,598**
New England	**5**	**1**		**46**	**4**	**33**	**60**
Maine				4	1	9	4
New Hampshire							
Vermont				1			2
Massachusetts	5	1		27	1		21
Rhode Island				8	1		1
Connecticut				6	1	24	32
Middle Atlantic	**7**	**7**	**2**	**162**	**11**	**188**	**326**
New York	4	7	[1] 1	45	3	111	205
New Jersey			1	59	1	32	44
Pennsylvania	3			58	7	45	77
East North Central	**11**	**1**	**22**	**136**	**18**	**89**	**459**
Ohio	2		2	18	5		125
Indiana	6			2		5	54
Illinois	2			9	5	42	100
Michigan			1	27	8	38	115
Wisconsin	1	1	19	80		4	65
West North Central	**4**	**1**	**1**	**49**	**7**	**25**	**163**
Minnesota	3		1	7			28
Iowa				4	1	1	57
Missouri				16	2	9	28
North Dakota				1		11	2
South Dakota		1		14	1		3
Nebraska				2	1		22
Kansas	1			5	2	4	23
South Atlantic	**65**	**1**	**419**	**31**	**8**	**229**	**224**
Delaware				2			2
Maryland	1			4		16	70
District of Columbia			1			13	10
Virginia	12		335	4	2	42	51
West Virginia	5		36	5	1	5	12
North Carolina	8	1		2	3		28
South Carolina	11		22	1		10	8
Georgia	27		16	12	2	129	23
Florida	1		9	1		14	20
East South Central	**34**	**2**	**25**	**66**	**12**	**40**	**92**
Kentucky	12			53	5	5	40
Tennessee	4	2	24	8	6		25
Alabama	12			4		18	9
Mississippi	6		1	1	1	17	18
West South Central	**32**	**1**	**1,101**	**67**	**2**	**235**	**94**
Arkansas	6		110	8		16	6
Louisiana	4			1		14	9
Oklahoma	3		57	7		14	9
Texas	19	1	934	51	2	191	70
Mountain	**7**		**80**	**50**	**3**	**26**	**61**
Montana	3		12	3	1		2
Idaho	2		6	13		8	18
Wyoming							2
Colorado	1		16	11	2	7	15
New Mexico	1			1		4	7
Arizona			46	3		7	13
Utah				19			4
Nevada							
Pacific	**6**	**13**	**18**	**91**	**4**	**30**	**119**
Washington	1		14	26	2		24
Oregon	1		2	8	1	15	29
California	4	13	2	57	1	15	66
Alaska			6			1	9
Hawaii			162	2			1

[1] New York City only.

Anthrax: New Jersey, 1 case; Pennsylvania, 2 cases.

Reported Cases of Selected Communicable Diseases: United States, Week Ended October 14, 1950—Continued

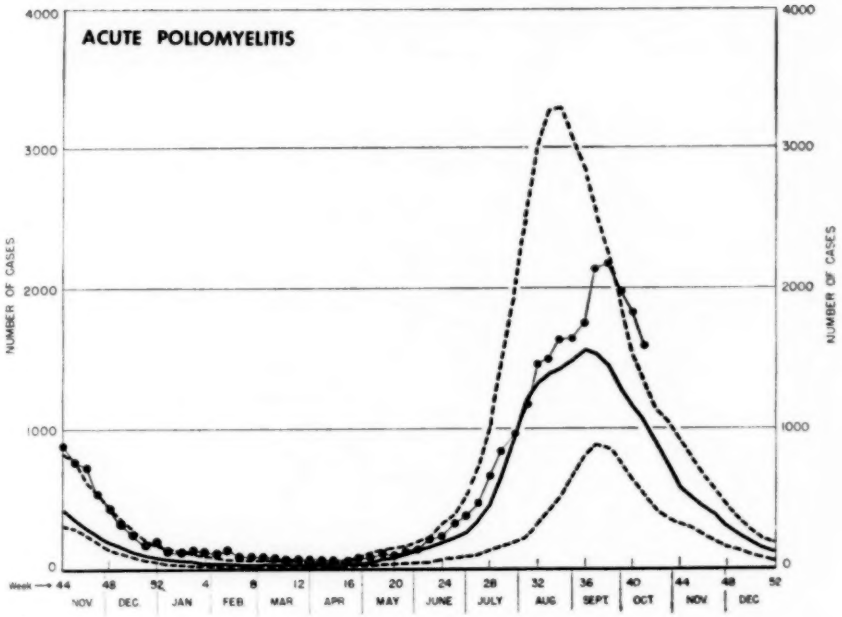
[Numbers after diseases are International List numbers, 1948 revision]

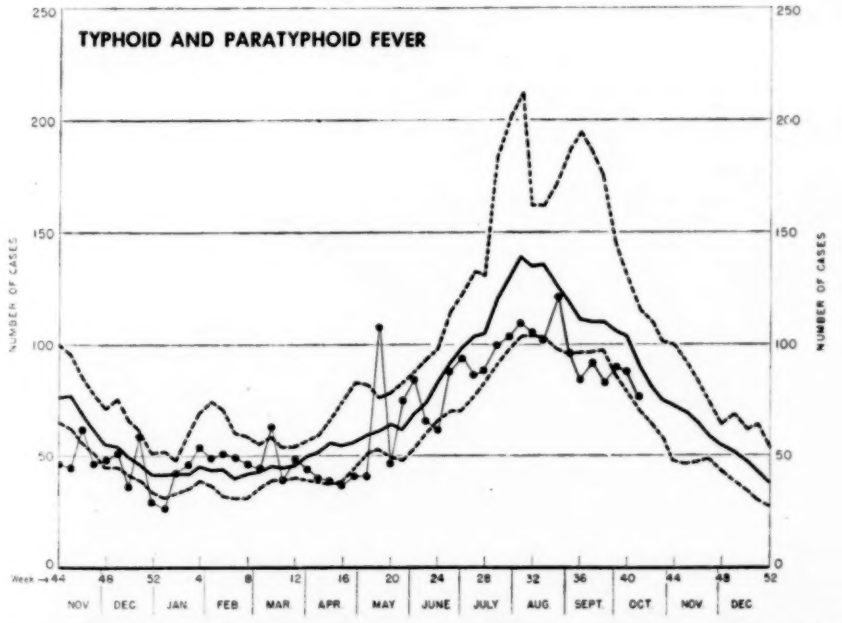
Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**10**	**659**		**6**	**76**	**1,328**	**98**
New England		**41**				**190**	
Maine		3				42	
New Hampshire						9	
Vermont		3				59	
Massachusetts		29				34	
Rhode Island						24	
Connecticut		6				22	
Middle Atlantic	**1**	**90**			**11**	**251**	**28**
New York		[2] 38			4	110	28
New Jersey		11				85	
Pennsylvania	1	41			7	56	
East North Central	**1**	**154**			**7**	**372**	**7**
Ohio	1	50			3	67	2
Indiana		16			1	46	
Illinois		22				21	4
Michigan		52			2	149	
Wisconsin		14			1	89	1
West North Central		**24**			**4**	**72**	**3**
Minnesota		8				11	1
Iowa		5				24	2
Missouri		3			3	2	
North Dakota		2				5	
South Dakota		1					
Nebraska		1			1	2	
Kansas		4				28	
South Atlantic	**8**	**133**		**1**	**13**	**122**	**10**
Delaware		2			3	1	
Maryland	1	6				20	
District of Columbia		2				2	
Virginia	7	20			2	31	
West Virginia		15			2	21	
North Carolina		63		1		30	
South Carolina		5			2	2	7
Georgia		15			3	13	3
Florida		5			1	2	
East South Central		**93**		**4**	**12**	**58**	**21**
Kentucky					2	13	11
Tennessee		65		2	2	28	4
Alabama		17			4	12	5
Mississippi		11		2	4	5	1
West South Central		**29**			**16**	**114**	**24**
Arkansas		3			4	9	
Louisiana					5	1	
Oklahoma		9				6	1
Texas		17			7	98	23
Mountain		**12**		**1**	**13**	**68**	**2**
Montana		3			1	12	
Idaho					1	14	
Wyoming							
Colorado		3			1	26	2
New Mexico		1			6	3	
Arizona					2	7	
Utah		5			1	6	
Nevada				1			
Pacific		**83**			**1**	**81**	**3**
Washington		29				25	
Oregon		9				5	
California		45			1	51	3
Alaska							
Hawaii						1	

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
NOTE.—Correction for Wyoming, week ended Oct. 7, 9 reported for rabies in animals; change to none.
Rabies in man: North Carolina, 1 case.

Communicable Disease Charts

All reporting States, November 1949 through October 14, 1950


ACUTE POLIOMYELITIS
NUMBER OF CASES
4000
3000
2000
1000
0
Week → 44 48 52 4 8 12 16 20 24 28 32 36 40 44 48 52
NOV DEC JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC


TYPHOID AND PARATYPHOID FEVER
NUMBER OF CASES
250
200
150
100
50
0
Week → 44 48 52 4 8 12 16 20 24 28 32 36 40 44 48 52
NOV DEC JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1950.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Sept. 23, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					1	1				8	10
Chickenpox			5		25	45	7	14	16	19	131
Diphtheria					1	2	1				4
Dysentery, bacillary					10	6				2	18
Encephalitis, infectious								2			2
German measles			9		6	37		3	7	11	73
Influenza			47				4				51
Measles			8		276	49	4	9	7	8	361
Meningitis, meningococcal			1							1	2
Mumps			5		124	70	4	32	28	16	279
Poliomyelitis				1	1	24	1	13	9	4	53
Scarlet fever	4		3		23	16	3	13	10	4	76
Tuberculosis (all forms)	7		12	1	42	26	48	13		72	221
Typhoid and paratyphoid fever					13	2		1		2	18
Venereal diseases:											
Gonorrhea	7		7	15	71	47	29	16	49	98	339
Syphilis (total)	6		7	9	41	20	1	7	2	11	104
Primary				1	4	5		1	1		12
Secondary				4	3					1	8
Other	6		7	4	34	15	1	6	1	10	84
Whooping cough	1				92	135	6	2	5	48	289

FINLAND

Reported Cases of Certain Diseases—August 1950

Disease	Cases	Disease	Cases
Diphtheria	55	Scarlet fever	468
Dysentery	3	Typhoid fever	22
Malaria	1	Venereal diseases:	
Meningitis, meningococcal	8	Gonorrhea	695
Paratyphoid fever	176	Syphilis	30
Poliomyelitis	48		

JAMAICA

Reported Cases of Certain Diseases—5 Weeks Ended September 30, 1950

Disease	Kingston	Other localities	Total
Chickenpox	4	16	20
Diphtheria	1	1	2
Dysentery, unspecified	2	1	3
Leprosy		3	3
Ophthalmia neonatorum		1	1
Poliomyelitis		3	3
Puerperal sepsis		1	1
Scarlet fever		2	2
Tuberculosis, pulmonary	33	63	96
Typhoid fever	21	58	79
Typhus fever (murine)	2		2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. During the period September 24–October 7, 1950, 397 cases of cholera were reported in Madras.

Indochina. During the week ended September 9, 1950, one case of cholera was reported in the port of Saigon, Viet Nam. Two cases were reported in Central and Southern Viet Nam during the month of July, and three cases during the month of August.

Plague

Brazil. Brazilian health authorities reported one case of plague found on a ship which arrived October 1, 1950, at Santos from Rosario, Argentina.

Indochina. Twelve cases of plague, with 4 deaths, were reported in Central and Southern Viet Nam during the month of July 1950, and 7 cases with 3 deaths were reported in that area during the month of August.

Smallpox

British East Africa. Reports from Tanganyika on cases of smallpox were as follows: Week ended August 26, 1950, 288 cases; week ended September 2, 92 cases; week ended September 9, 141 cases. During this 3-week period 121 deaths occurred. These cases and deaths were chiefly in the Southern Province.

Dahomey. Sixty-two cases of smallpox were reported in Dahomey during the period September 11–30, 1950.

India (French). Smallpox was reported in Pondicherry as follows: Weeks ended September 9 and 16, 26 (16 deaths) and 12 cases, respectively.

Indonesia. For the week ended September 23, 1950, 47 cases of smallpox were reported in Bandjermasin, Borneo. Reported cases for the weeks ended September 9 and 16, were 38 and 31, respectively.

Togo (French). For the period September 11–30, 1950, 30 cases of smallpox with 9 deaths were reported in French Togo.

Typhus Fever

Egypt. One case of typhus fever was reported in Cairo during the week ended September 16, 1950, and one case during the week ended September 23.

Spain. During the week ended August 26, 1950, 3 cases of typhus

fever were reported in Spain—2 in the City of Madrid and 1 in Huelva Province. During the week ended September 2, 6 cases were reported in Madrid, 1 in the port of Huelva, and 1 in Huelva Province.

Yellow Fever

Belgian Congo. On August 26, 1950, one fatal case of yellow fever was reported at Baye, a village north of Bondo, in Stanleyville Province.

Colombia. One death from yellow fever was reported on July 16, 1950, at Ocana, North Santander Department.

Plague Infection in Dallam County, Texas

A report, dated October 6, 1950, states that plague infection was proved positive for the following specimens obtained in Dallam County, Tex.: 64 fleas, *Opisocrostis hirsutus,* from prairie dog burrows collected by flagging September 26, 1950; and 168 fleas, *Opisocrostis hirsutus,* from 2 prairie dogs, *Cynomys ludovicianus,* shot September 26, 1950. These specimens were taken 2½ miles west of Perico, and are the first positive specimens obtained in Dallam County.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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